

**Claims (as amended 24 June 2004)**

1. A method for implementing quality of service in data transmissions of a communication network,  
characterized by the steps of:
  - 5 receiving in a node of the communication network on one layer (301, 401, 501) of a communication protocol stack a packet sent by an application, the communication protocol stack implementing a certain communication protocol set used in the communication network,
  - 10 determining in the communication protocol stack a quality of service level of the packet as a function of information transmitted with said packet, the function being composed of a rule/rules (308, 408, 506) which are configurable from outside of the communication protocol stack and, in accordance with the determined quality of service level,
  - 15 performing in the communication protocol stack one of the following quality of service operations: transmitting the packet to another application via the communication network, removing of the packet, or placing the packet (307, 407, 503) with the quality of service level in a queue (306, 406, 507), wherein at least handling of the queue is placed in the communication protocol stack.
- 20 2. The method as described in claim 1, characterized by the further step of:
  - 25 replacing the packet in the queue in another position when either the number of packet retransmission requests or the number of missing packet acknowledgements reaches a predetermined threshold value, wherein the other position in the queue is determined by the quality of service level of the packet.
- 30 3. The method as described in claim 1, characterized by the further step of:
  - 35 removing the packet from the queue on grounds of the quality of service level of the packet when either the number of packet retransmission requests or the number of missing packet acknowledgements reaches a predefined threshold.
4. The method as described in claim 1, characterized by the further step of:
  - 35 calculating usable transmission capacity by taking into account maximum transmission capacity of the node of the communication network

and the number of bytes currently used to receive data at said node and, on ground of the quality of service level of the packet and the usable transmission capacity

performing a certain operation directed to the packet.

5 5. The method as described in claim 1, characterized in that the quality of service level is composed of at least two attributes of which one determines the position of the packet in the queue when either the number of packet retransmission requests or the number of missing packet acknowledgements reaches a predetermined threshold.

10 6. The method as described in claim 1, characterized in that the information transmitted with a packet contains at least one of the following pieces of information: an identifier of the application, user data related to the application, a model of a terminal through which the packet was sent, an Internet peripheral address, a calling number, an operator prefix, a 15 called party, a site from which the packet was sent, or a time when the packet was sent.

20 7. The method as described in claim 1, characterized in that the rule/rules are configurable by at least one of the following parties: a user of the application, a receiver of the packet, a service provider of the communication network, or an administrator administrating the use of the method.

8. The method as described in claim 1, characterized by the further step of:

25 receiving at said node a packet sent from another node of the communication network, said packet being intended for configuring the rule/rules.

9. The method as described in claim 1, characterized by the further step of:

30 sending a packet from said node to another node of the communication network, said packet being intended for configuring the rule/rules of the other node.

10. The method as described in claim 1, characterized in that the method is implemented in one layer of the communication protocol stack.

11. The method as described in claim 1, characterized in that the method is implemented in at least two layers of the communication protocol stack.

12. The method as described in claim 11, characterized in 5 that the communication between said layers is based on an additional header which is transmitted with the packet from one layer to another, the additional header including the quality of service level of the packet.

13. The method as described in claim 11, characterized in that the communication between said layers is performed as follows:

10 receiving the packet on a layer of the communication protocol stack,

sending a quality of service level request from said layer to an upper layer of the communication protocol stack, the quality of service level request including information about the packet received, and

15 returning from said upper level of the communication protocol stack the quality of service level of the packet as a response to the quality of service level request.

14. The method as described in claim 1, characterized in that the communication protocol stack is a WAP stack.

20 15. An apparatus for implementing quality of service in data transmissions of a communication network,

characterized in that the apparatus includes a communication protocol stack, which implements a certain communication protocol set used in the communication network, and the apparatus is 25 adapted to

receive in a node of the communication network on one layer (301, 401, 501) of the communication protocol stack a packet sent by an application,

30 determine in the communication protocol stack a quality of service level of the packet as a function of information transmitted with said packet, the function being composed of a rule/rules (308, 408, 506) which are configurable from outside of the communication protocol stack, and in accordance with the determined quality of service level,

35 perform in the communication protocol stack one of the following quality of service operations: transmitting the packet to another application

via the communication network, removing of the packet, or placing the packet (307, 407, 503) with the quality of service level in a queue (306, 406, 507), wherein at least handling of the queue is placed in the communication protocol stack.

5        16. The apparatus as described in claim 15, characterized in that the apparatus is further adapted to replace the packet in the queue in another position when either the number of packet retransmission requests or the number of missing packet acknowledgements reaches a predetermined threshold value, wherein the other position is determined by 10 the quality of service level of the packet.

15        17. The apparatus as described in claim 15, characterized in that the apparatus is further adapted to remove the packet from the queue on grounds of the quality of service level of the packet when either the number of packet retransmission requests or the number of missing packet acknowledgements reaches a predetermined threshold value.

20        18. The apparatus as described in claim 15, characterized in that the apparatus is further adapted to calculate usable transmission capacity by taking into account maximum transmission capacity of the apparatus and the number of bytes currently used to receive data and, on ground of the quality of service level of the packet and the usable transmission capacity

25        perform a certain operation directed to the packet.

19. The apparatus as described in claim 15, characterized in that the quality of service level is composed of at least two attributes, of 25 which one determines the position of the packet in the queue when either the number of packet retransmission requests or the number of missing packet acknowledgements reaches a predetermined threshold.

30        20. The apparatus as described in claim 15, characterized in that the information transmitted with a packet contains at least one of the following pieces of information: an identifier of the application, user data related to the application, a model of a terminal through which the packet was sent, an Internet peripheral address, a calling number, an operator prefix, a called party, a site from which the packet was sent, or a time when the packet was sent.

35        21. The apparatus as described in claim 15, characterized in that the rule/rules are configurable by at least one of the following parties:

a user of the application, a receiver of the packet, a service provider of the communication network, or an administrator of the apparatus, and the apparatus is further adapted to provide at least one user interface for said parties.

5        22. The apparatus as described in claim 15, characterized in that the apparatus is further adapted to

receive at said node a packet sent by another node of the communication network and

10      configure the rule/rules in accordance with the content of said packet.

23. The apparatus as described in claim 15, characterized in that the apparatus is further adapted to

send a packet from said node to another node of the communication network, said packet being intended for configuring the rule/rules of the other node.

15      24. The apparatus as described in claim 15, characterized in that the modified communication protocol stack is a WAP stack.

25      25. The apparatus as described in claim 15, characterized in that the apparatus is a terminal.

20      26. The apparatus as described in claim 15, characterized in that the apparatus is a server.

27. The apparatus as described in claim 15, characterized in that the apparatus includes at least one of the following devices/software: a WAP gateway, a proxy server, or a HTTP server.

25      28. The apparatus as described in claim 15, characterized in that the apparatus is further adapted to communicate with at least one the following external systems: a billing system, a subscriber database, or a positioning system.